

Is POSIX PSE 52 viable?

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What is PSE 52?

- PSE 52 is one of 4 standardized 'real-time' profiles established by IEEE Std 1003.13-1998
 - PSE 51, 52 do not require multiple process support
 - PSE 51, 53 do not require file systems
 - All require threads, other real-time and 'classic Unix' features
 - PSE 52 API subset of PSE 54, PSE 51 subset of PSE 52
- Substantial use within DoD of PSE 52 in specifications
 - JTA, JTA-Army, RT DII COE

Industry Implementations of PSE 52

- Industry support for PSE 52 has been less forthcoming
 - LynxOS says you can configure a PSE 52 kernel
 - VXWorks does not conform (missing many operations)
 - Other vendor support ranges from “No, this makes no sense” to “I guess you could configure to PSE 52, but why would you want to?”
(based on OpenGroup Realtime & Embedded Forum panel responses)
- Wide industry acceptance of PSE 52-like operating systems
 - Single process, shared memory, files, possibly threads
 - VXWorks most commonly used RT OS

Technical Issues with PSE 52

- Single-process model puts all code into single memory space
 - Reduces memory requirements, timing, synchronization
 - Makes error handling more difficult (any problem in any module affects entire system)
 - Potential security issues with all memory visible to all code
- Mixes 'hard real-time' operations with 'potentially unbounded' file operations
- Negative aspects emphasized when trying to reuse code
 - Different developers follow different rules

Technical Issues (continued)

- Single Process/Single memory significant variation from Unix (and Win32) programming models
 - Porting code from Unix to PSE 52 much more difficult than porting to PSE 54
 - Need ways to collapse independent processes into single process/address space
- Easier to run PSE 52 applications on PSE 54 environment, than vice-versa

PSE 52 as “cover for VXWorks”?

- One vendor said* that “PSE 52 was just a cover to allow VXWorks to be used on government contracts without conforming to standards”
 - But VXWorks doesn’t even live up to PSE 52
- Perception that Government not serious about standards compliance
 - Another example: WinNT in DII COE

* OpenGroup RT and Embedded Forum, 28 Jun, Austin TX

Key Issues for Government

- If PSE 52 is not commercially viable (due to lack of vendor support), what should we specify?
- DISA has not committed to PSE 52 basis for DII COE Kernel
 - Accepted as design goal only
 - DISA delivery against LynxOS/PSE 54
- Options
 - Continue to require PSE 52, expect vendors to follow
 - “Grandfather” VXWorks as special case
 - Move to PSE 54

Continue with PSE 52?

- VXWorks would not conform as currently configured
 - Significant hit to existing programs and contractors with investment in VXWorks
 - Expect VXWorks waivers for future programs
- Other OS could move into PSE 52 domain
 - E.g. LynxOS
- VXWorks may decide to conform
 - Would help considerably, but still must face assertion that PSE 52 “wired” for VXWorks

Accept VXWorks as special case?

- Special status justified by wide use of VXWorks in current systems, WindRiver's place in the marketplace
 - Analogy is WinNT in "DII COE classic"
 - Portray as a "to-be-honest" move given VXWorks use in DoD
- Moves Government away from commitment to standards, JTA, etc.

Move to PSE 54?

- Wide industry support for PSE 54
 - Both RTOS and ‘traditional Unix’ vendors
- Timing and sizing not as problematic as in the past
 - Configurable kernels allow tailoring to meet specific program needs
- PSE 54 much easier for software reuse
 - Porting from Unix easier
 - Better security and fault isolation features
 - Can run PSE 52 applications within single process in many cases
- Makes VXWorks systems “second-class citizens”

Recommendation to Services

- Look at RT OS usage within Service
 - Non-conformant
 - PSE 52 conformant
 - PSE 54 conformant
- Consider effects of vendor non-support of PSE 52
- Consider effects of move to PSE 54
- Request Services identify preferred Course of Action